

**Claims**

- 1 1. A seat belt retractor (20) characterized by low  
2 operating noise, dust, corrosion and moisture  
3 resistance comprising:  
4 an integrally formed frame having a  
5 quadrilaterally shaped main body (24) and at least  
6 one mounting member (60).
- 1 2. The retractor as defined in Claim 1 wherein the  
2 frame is made from one of a polymer having at least  
3 a 50% content of glass fibers.
- 1  
1 3. The retractor as defined in Claim 2 wherein  
2 most of the glass fibers are at least 2000 microns  
3 in length.
- 1 4. The retractor as defined in Claim 1 wherein the  
2 main body (24) includes integrally formed secondary  
3 features including: an integrally formed spring wall  
4 (140) for forming a spring cavity for receipt of a  
5 rewind spring (130).
- 1 5. The retractor as defined in Claim 4 wherein the  
2 integrally formed secondary features further include  
3 an integrally formed mechanism housing wall (170).
- 1 6. The retractor as defined in Claim 4 wherein the  
2 secondary features include a vehicle sensor support.

1 7. The retractor as defined in Claim 4 wherein the  
2 secondary features include a pin integrally formed  
3 on a side of the frame, the pin adapted to  
4 rotationally support a lock pawl.

1 8. The retractor as defined in Claim 7 wherein the  
2 pin is provided with a means for flexing in response  
3 to reaction forces generated through the lock pawl.

1 9. The retractor as defined in Claim 8 wherein the  
2 frame includes a distributing structure to  
3 distribute pin reaction forces without the sides of  
4 the frame.

1 10. The retractor as defined in Claim 9 wherein the  
2 distributing structure includes a strut (252) that  
3 links opposing frame sides and includes extending  
4 portions positioned below the lock pawl to receive  
5 the lock pawl as the pin deforms.

1 11. The retractor as defined in Claim 1 wherein the  
2 lower mounting member (30) includes one of a hook  
3 and a cavity adapted to receive a mating member  
4 (98;100) of a mounting surface.

1 12. The retractor as defined in Claim 11 further  
2 including an upper mounting member adapted to be  
3 attached to another portion of the mounting surface.

1 13. The retractor as defined in Claim 1 wherein the  
2 main body portion includes integrally formed sides  
3 and wherein the each side only includes one opening.

1 14. The retractor as defined in Claim 13 wherein  
2 the main body portion includes integrally formed  
3 bearing surfaces on each side.

1 15. The retractor as defined in Claim 1 wherein the  
2 secondary features are integrally molded into the  
3 main body providing improved dimensional control  
4 from reduced part count and complexity.

1 16. The retractor as defined in Claim 5 including a  
2 first and a second mechanism housing wall separated  
3 by a space (171) from the first mechanism housing  
4 wall.

1 17. The retractor as defined in Claim 16 including  
2 acoustic insulation between the first and second  
3 mechanism housing walls.

1 18. A seat belt retractor (20) comprising:  
2 a composite, reinforced resin frame (22) with  
3 integral provision to accept and receive a spool and  
4 a quantity of seat belt webbing, the frame capable  
5 of withstanding an empty spool pull test of about at  
6 least 1136 Kg).

1 19. The retractor as defined in Claim 18 wherein  
2 the frame is made from one of a polymer having at  
3 least a 50% content of glass fibers.

1 20. The retractor as defined in Claim 19 wherein  
2 most of the glass fibers are at least 2000 microns  
3 in length.

1 21. The retractor as defined in Claim 1 further  
2 including a lock wheel with a plurality of teeth and  
3 a lock pawl with at least two lock teeth adapted to  
4 engage corresponding teeth on the lock wheel, and  
5 wherein the lock pawl includes first means for  
6 enabling the lock pawl to flex under determinable  
7 crash loads, wherein in response to such flexing,  
8 both teeth of the lock pawl will engage a  
9 corresponding tooth of the lock wheel.

1 22. A combination of seat belt retractor (20) and a  
2 mounting surface upon which the retractor is  
3 mounted,  
4 the retractor including:  
5 a frame which supports a spool on which a  
6 seat belt is wound, the frame includes a lower  
7 mounting member (60) in the form of one of a cavity  
8 and a hook and the mounting surface includes a  
9 mounting element adapted to be received within the  
10 cavity or hook, the lower mounting member, when the  
11 retractor is under load, absorbing most of the crash  
12 forces, the frame further including an upper  
13 mounting member (160) the purpose of which is to  
14 prevent upper portions of the frame from moving away  
15 from the mounting surface.

1 23. A seat belt retractor comprising:  
2 a lock wheel having a plurality of teeth and a lock  
3 pawl for lockingly engaging the lock wheel, means  
4 for moving the lock pawl from a disengaged position  
5 into engagement with the teeth of the lock wheel,  
6 the lock pawl including at least two lock teeth  
7 adapted to engage corresponding teeth on the lock

8 wheel, and wherein the lock pawl includes first  
9 means for enabling the lock pawl to flex under  
10 determinable crash loads, wherein in response to  
11 such flexing, both teeth of the lock pawl will  
12 engage a corresponding tooth of the lock wheel.

1 24. The retractor as defined in Claim 23 including  
2 a frame formed of a resin, reinforced material, the  
3 frame including a pin (210) for rotationally  
4 supporting the lock pawl, wherein the pin is  
5 provided with a means for permitting the pin to flex  
6 in response to reaction forces generated through the  
7 lock pawl.

1 25. The retractor as defined in Claim 24 wherein  
2 the frame includes a distributing structure to  
3 distribute pin reaction forces without the sides of  
4 the frame.

1 26. The retractor as defined in Claim 25 wherein  
2 the distributing structure includes a strut (252)  
3 that links opposing frame sides and includes  
4 extending portions positioned below the lock pawl to  
5 receive the lock pawl as the pin deforms.